

Equipment Condition Report

Overall Diagnosis

CRITICAL

London Offshore Consultants, Inc
Att Tom Ronning
16800 Imperial Valley Drive, Suite 280
HOUSTON TX 77060
USA

Machine ID: **Flag Gangos - Pump 1 - Port**
Application: **Hydr system**
Make/Type:
Cust. Order N°:
Product: Shell Tellus T 32

Product (h/km):
Machine (h/km):
Filter (h/km):
System (l):
Top-up (l):

Lab Sample N°: **GP895**
Label N°:
Equipment Ref. N°: **LGP658**
Sample Taken: 29/10/2014
Sample Received: 03/11/2014

GP895

29/10/2014

CRITICAL

Reported Maintenance:

No maintenance actions mentioned.

Comments Oil Condition:

Visual aspect: light brown coloured, turbid, with visual foreign matter.

The water content is not significant: 54 ppm.

The kinematic viscosity @40°C, 32.06 mm²/s, complies with the mentioned ISO VG32 specification limit.

The kinematic viscosity @50°C is 22.26 mm²/s

The kinematic viscosity @60°C is 16.14 mm²/s

The kinematic viscosity @70°C is 12.14 mm²/s

The kinematic viscosity @100°C is 6.1 mm²/s

The oil's acidity is considered acceptable for this application: 0.43 mgKOH/g.

The ICP spectrometry reveals 31 ppm copper, 22 ppm lead, 19 ppm tin and 12 ppm iron.

Comments Machine Condition:

The WPC is used to establish a wear baseline because the WPC remains more or less the same from sample to sample over a period of time as long as a machine is operating normally. The current WPC, 353 is difficult to diagnose without historical data, but is too high though for a hydraulic system.

The microscopic evaluation of the ferrogram shows that the ferrous wear primordially consists of small rubbing wear platelets, <15 µm. Heat treatment reveals that 85% of the ferrous wear particles are low alloy steel.

The amount of dark oxides is notable. (index : 6).

The presence of non-magnetic wear particles is also non-negligible. They concern blank metal.

The system contamination is high (index: 7). It consists of mostly sand/dust/silt and also carbonaceous particles.

Recommendations:

Without historical data it is difficult to give adequate recommendations, but based on current analysis results we consider the overall condition cautiously as CRITICAL.

Keep under close observation.

It is recommended that this unit is checked for any unusual operating conditions. Monitor temperatures, pressures, noises, filtration, ... as applicable.

We recommend the efficiency of the system filter is checked.

A preventive oil change is advised. Check the recommendations of the manufacturer concerning oil change.

Ensure representative sampling of the system.

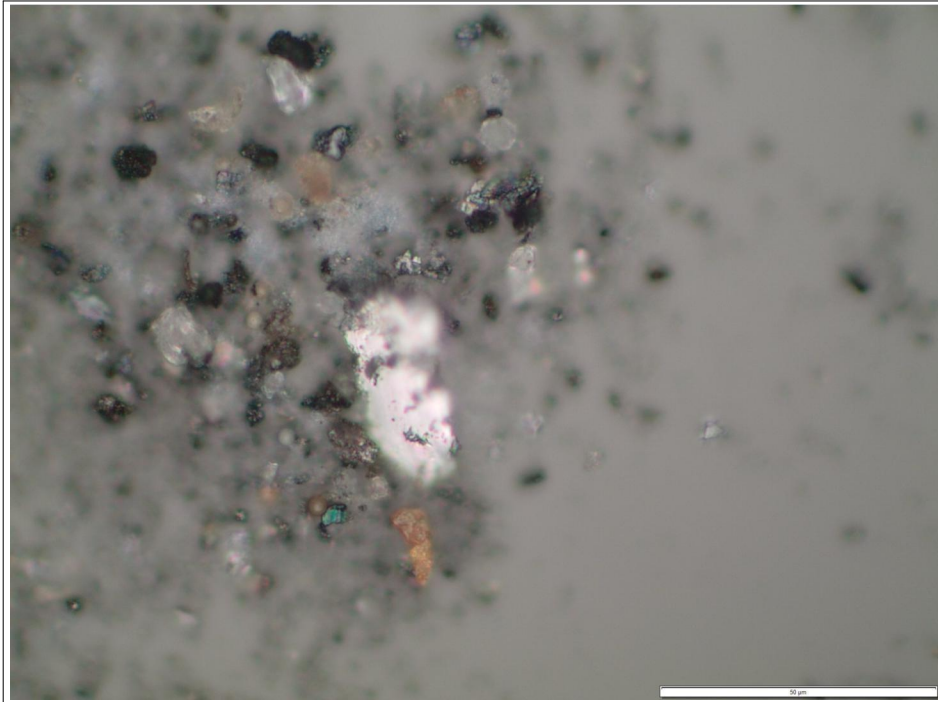
Equipment Condition Report

Sample Reported: 06/11/2014 Hilde Lecluyse

Equipment Condition Report

Test Name	Method	Unit	Results
			GP895
PHYSICAL-CHEMICAL ANALYSIS			
Colour	ASTM-D1500	-	4.5
Visual appearance	OMS 13882	-	turbid
Determination of water (KF)	ASTM-D6304	ppm	54
Kinematic Viscosity @40°C	ASTM-D445	mm²/s	32.06
Kinematic Viscosity @100°C	ASTM-D445	mm²/s	6.098
Acid Number (AN)	ASTM-D664	mg KOH/g	0.43
PQ - Wear index	OMS 14406	-	
ELEMENTAL ANALYSIS			
Aluminium (Al)	ASTM-D5185	ppm	0
Barium (Ba)	ASTM-D5185	ppm	0
Calcium (Ca)	ASTM-D5185	ppm	35
Chromium (Cr)	ASTM-D5185	ppm	0
Copper (Cu)	ASTM-D5185	ppm	31
Iron (Fe)	ASTM-D5185	ppm	12
Magnesium (Mg)	ASTM-D5185	ppm	26
Molybdenum (Mo)	ASTM-D5185	ppm	1
Sodium (Na)	ASTM-D5185	ppm	5
Nickel (Ni)	ASTM-D5185	ppm	0
Phosphorus (P)	ASTM-D5185	ppm	289
Lead (Pb)	ASTM-D5185	ppm	22
Silicon (Si)	ASTM-D5185	ppm	1
Tin (Sn)	ASTM-D5185	ppm	19
Zinc (Zn)	ASTM-D5185	ppm	266
Potassium (K)	ASTM-D5185	ppm	0
WEAR INDEX			
Optical density - large	OMS 13875	-	383.0
Optical density - small	OMS 13875	-	70.0
WPC - Wear Index	OMS 13875	-	353.0
% Large particles	OMS 13875	%	69
ANALYTICAL FERROGRAPHY			
FERROUS			
Normal rubbing wear (FW-NR)	ASTM-D7690	µm max.	< 15
Severe sliding wear (FW-SS)	ASTM-D7690	µm max.	
Abrasive wear (FW-AW)	ASTM-D7690	µm max.	
Fatigue chunks (FW-FC)	ASTM-D7690	µm max.	
Fatigue flakes (FW-FF)	ASTM-D7690	µm max.	
Spheres (FW-S)	ASTM-D7690	µm max.	
Dark oxides index (FW-DOI)	ASTM-D7690	-	6
Red oxides - Rust index (FW-ROI)	ASTM-D7690	-	2
Corrosive wear (FW-Cor)	ASTM-D7690	µm max.	
Ferrous wear - Severity index (FW-SI)	ASTM-D7690	-	
NON-FERROUS			
White metal alloy wear (NFW-WM)	ASTM-D7690	µm max.	40
White metal - Severity index (NFW-WMI)	ASTM-D7690	-	4
Copper alloy wear (NFW-Cu)	ASTM-D7690	µm max.	
Copper alloy index (NFW-Cul)	ASTM-D7690	-	
Non ferrous - Severity index (NFW-SI)	ASTM-D7690	-	4
CONTAMINANTS			
Crystalline particles index (Con-CPI)	ASTM-D7690	-	7
Amorphous particle index (Con-API)	ASTM-D7690	-	2
Friction polymer severity index (Con-FPI)	ASTM-D7690	-	2
Fibres - Severity index (Con-Fibl)	ASTM-D7690	-	1
Other contaminants index (Con-OCI)	ASTM-D7690	-	4
Contamination severity index (Con-SI)	ASTM-D7690	-	7

Equipment Condition Report



Large non-ferrous blank metal particle.